Japanese Patent Office
Patent Laying-Open Gazette

Patent Laying-Open No. 1-185617
Date of Laying-Open: July 25, 1989
International Class(es): G02F 1/133

Title of the Invention: Interface Structure of Liquid Crystal Panel

Patent Appln. No. 63-8881
Filing Date: January 19, 1988
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(transliterated, therefore the spelling might be incorrect)

SPECIFICATION

1. Title of the Invention

Interface Structure of Liquid Crystal Panel

2. Claims

(1) An interface structure of a liquid crystal panel for image display which has the basic structure where electrodes are placed inside the space between upper and lower glass panels, and after that, orientation films are

attached on the inside of upper and lower glass panels and liquid crystal is sealed between the upper and lower glass panels, characterized in that the surfaces of the orientation films are fluoridized in at least one of the conditions before or after orientation processing has been carried out on the surfaces of the orientation films which make contact with the liquid crystal.

(2) The interface structure of a liquid crystal panel according to Claim 1, characterized in that inorganic fluoride is plasma-polymerized according to the method for fluoridizing the surfaces of said orientation films.

(3) The interface structure of a liquid crystal panel according to Claim 1, characterized in that the fluoridized regions on the surfaces of said orientation films are the regions other than the regions to which a seal frame is attached in order to make upper and lower glass panels adhere.

3. Detailed Description of the Invention

[Field of Industrial Application]

The present invention relates to surface processing on orientation films of liquid crystal panels for image display.

[Prior Art]

Fig. 2 shows an interface structure of a liquid crystal panel according to the prior art.

Electrodes 2 are placed inside the space between upper and lower glass panels 1, and orientation films 3 are attached to the inside thereof in a manner where liquid crystal is sealed in a uniform gap supported by spacers after orientation processing has been carried out on the surfaces of orientation films 3 in the basic

structure of a liquid crystal panel.

A voltage is applied across upper and lower electrodes 3 so that the orientation of liquid crystal can be changed, and thereby, the condition of light transmission can be changed in the case where polarizing plates are attached to the external surfaces of upper and lower glass panels 1. Image display is also possible by changing the condition of voltage application to an arbitrary electrode for each pixel.

Rubbing is a general method for orientation processing on the surfaces of orientation films 3. Liquid crystal in the vicinity of the surfaces of orientation films 3 is uniformly directed in the direction of rubbing, and is directed in the direction of the cross-section, maintaining a constant tilt angle. Polymer films such as polyimide and polyvinyl alcohol, as well as SiO_2 films, are often used as the orientation films having easy orientation.

[Problem to be Solved by the Invention]

Here, specifically, it is possible to attach a polymer such as polyimide to a substrate according to a simple application method such as spin coating. However, such a method causes a problem where the surfaces easily allow impurity molecules or the like to adhere, and thus the orientation performance after orientation processing deteriorates due to the adhering impurity, and a problem where unevenness in the image quality of the liquid crystal panel for image display occurs, due to a difference in the orientation performance between the portions to which impurities adhere and do not adhere. The unevenness of the image quality may include unevenness in the contrast, unevenness in brightness or the like.

The present invention is provided in order to solve such problems, and an object thereof is to provide a method for preventing deterioration in the image quality or unevenness in the image quality of a liquid crystal panel for image display by suppressing adhesion of impurities to the surfaces of the orientation films of a liquid crystal panel so that uniform orientation performance can be maintained constantly.

[Means for Solving Problem]

An interface structure of a liquid crystal panel for image display according to the present invention has the basic structure where electrodes are placed inside the space between upper and lower glass panels, and after that, orientation films are attached on the inside of upper and lower glass panels and liquid crystal is sealed between the upper and lower glass panels, and is characterized in that the surfaces of the orientation films are fluoridized in at least one of the conditions before or after orientation processing has been carried out on the surfaces of the orientation films which make contact with the liquid crystal. In addition, the interface structure of a liquid crystal panel is characterized in that inorganic fluoride is plasma-polymerized according to the method for fluoridizing the surfaces of the above described orientation films. Furthermore, the interface structure of a liquid crystal panel is characterized in that the fluoridized regions on the surfaces of the above described orientation films are the regions other than the regions to which a seal frame is attached in order to make upper and lower glass panels adhere.

[Working Effects]

In the case where the surface of a versatile hydrocarbon-based polymer is fluoridized, the critical surface tension on the surface is reduced, and the wetness of water, oil and other substances on the surface deteriorates, making adhesion difficult.

Plasma of an inorganic fluoride such as NF_3, BF_3 or SiF_4 is not polymerized in itself, but rather, supplies a stable free fluorine radical which is used to easily gain the surface having C-F bonds.

[Embodiment]

An embodiment of the present invention is described in the following. Fig. 1 is a cross-sectional view showing an interface structure of a liquid crystal panel according to the present invention. The surfaces of orientation films 3 are shallowly fluoridized, creating fluoridized surfaces 5. Orientation processing may be carried out either before or after the fluoridation, and there is also a method where orientation processing is carried out twice, once before and once after the fluoridation, under which especially high orientation performance of liquid crystal can be expected. Concrete methods for fluoridization of the surfaces may include a method for using F_2 gas directly, which causes a harsh reaction and is dangerous to handle, and thus requires a special unit. Plasma of an inorganic fluoride such as NF_3, BF_3 or SiF_4 is not polymerized in itself, but rather, supplies a stable free fluorine radical which is used to easily gain the surface having C-F bonds, and therefore, the surfaces are primarily fluoridized by means of plasma polymerization of inorganic fluoride. In addition, the strength of the adhesion of the fluoridized surfaces generally deteriorates, and therefore, the regions to which a seal frame is attached in order to

make upper and lower glass panels adhere are not fluoridized.

[Effects of the Invention]

The present invention prevents the orientation performance of the orientation films from deteriorating due to adhesion or osmosis, to the orientation films, of an impurity that is included in the liquid crystal during the process of panel assembly or during the usage after the completion of the panel, resulting from fluoridization of the surfaces of the orientation films, particularly a substance such as water, oil, liquid crystal itself, or an impurity due to other causes during the process of assembly. Accordingly, the high orientation controlling force of the orientation films can be maintained for a long period of time, and therefore, a reliable liquid crystal display panel having high image quality can be provided. The present invention provides the same effects to liquid crystal panels for any use, in addition to those for image display, as long as the liquid crystal display panels have the above described basic structure.

4. Brief Description of the Drawings

Fig. 1 is a cross-sectional view showing the interface structure of a liquid crystal panel according to the present invention; and Fig. 2 is a cross-sectional view showing the interface structure of a liquid crystal panel according to the prior art.

1 glass panels
2 electrodes
3 orientation films
4 liquid crystal
5 fluoridized surfaces according to the present

invention
6 adhering impurity molecules

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